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Space Transportation Solutions for Deep Space Missions (8)

Author: Mr. Vidhu Dixit
University of Petroleum and Energy Studies, India, vidhudixit.v7@gmail.com

Ms. Ira Yadav
University of Petroleum and Energy Studies, India, ira.yadav995891@gmail.com
Ms. Apurva Gajbhiye
University of Petroleum and Energy Studies, India, apurva1642@gmail.com
Mr. Ramesh Kumar
University of Petroleum and Energy Studies, India, ramesh.kumar@ddn.upes.ac.in

LUNAR LAUNCHES: A COMPARATIVE STUDY OF FLIGHT TIME AND FUEL REQUIREMENTS FROM EARTH AND THE MOON FOR MISSIONS TO MARS

Abstract

Interplanetary travel is a frontier that has captivated human imagination for decades. Recent ideas of establishing sustainable colonies on Mars and NASA's plans for developing a lunar gateway for deep space missions have reignited this fascination. Various space companies and government agencies have set their sights on Mars as the next destination for human exploration and are working to bring the dream of settling a colony on Mars to life. These plans have set the groundwork for a new era of space exploration that seeks to go beyond low-Earth orbit and explore new destinations in our solar system. This paper aims to explore the potential benefits and challenges of utilizing moon as a launchpad for interplanetary travel, specifically focusing on how lunar launches will impact the missions to Mars. Through a comparative study of flight time and fuel estimations between lunar launches and conventional earth launches, we hope to provide insights into which launch method may be more efficient and effective for missions to Mars. The idea of settling a colony on Mars poses several challenges, including long travel times, limited resources, and harsh living conditions. On the other hand, a lunar base might serve as a steppingstone for space exploration and could be utilized as a testing ground for new technologies. By understanding the benefits and challenges of lunar launches, we can better equip ourselves with the knowledge and tools needed to expand our reach into the cosmos and unlock new frontiers of scientific discovery. Our study will utilize the existing literature and advanced simulation software to model each launch scenario, considering the estimates of fuel efficiency, rocket performance, and the distance between Earth, Moon, and Mars. This simulation will allow us to compare the flight time for each launch scenario and examine the potential benefits and drawbacks of each approach. This paper seeks to contribute to the ongoing discussions about the future of space exploration and provide insights that can help guide the development of new technologies and strategies for interplanetary missions.

Keywords: Mars; Moon; Earth; lunar launch; mission design